

ISO New England Smart Grid Investment Grant Overview

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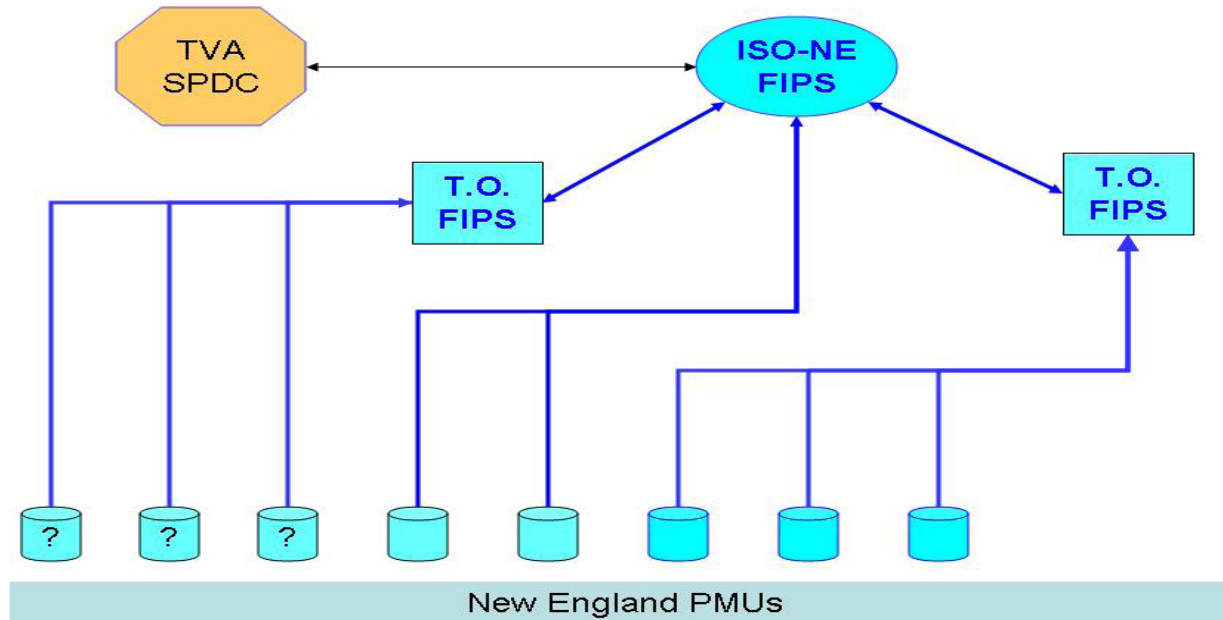
NASPI Work Group Meeting
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Project Overview

- Project goal:
 - “Provide the Smart Grid technology platform upon which advanced analysis and visualization tools can be deployed to enhance situational awareness.”
- Technology:
 - Enhanced Phasor Data Concentrator
 - Flexible Integrated Phasor System (FIPS)
 - Uses vendor neutral protocols capable of handling PMUs of various designs and capabilities
 - Support for various communication schemes:
 - Corporate WAN (SONET, etc.) and/or commercial services (MPLS, FRAME, etc.)
- \$18 million total, \$7.9 million from DOE

System Design Elements

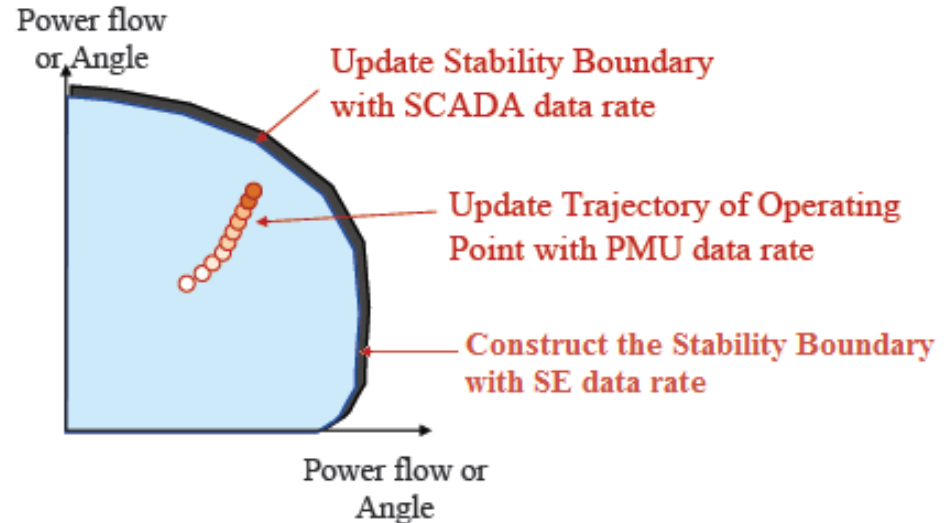
Expanded T.O. FIPS/PDC Deployment



- Approximately 30 additional locations
- Up to 7 FIPS/PDCs at Transmission Owners
- Synchrophasor Application:
 - Region of Stability Existence (ROSE)

Region of Stability Existence (ROSE): Utilizing PMU Data

- ROSE uses synchrophasors, SCADA data and SE results for on-line calculation and visualization of the current operating point and its proximity to the stability boundary



Figure, see <http://ewh.ieee.org/reg/1/809/Litvinov.pdf>.

This project is special because...

- Distributed approach:
 - Not one central, Super PDC
 - Data directly available to Transmission Owners
- FIPS PDC:
 - Database designed for retrieval of data
 - Uses open source software
 - TVA Super PDC open source software
 - ISO-NE cyber security & IT requirements addressed at the start
 - User interface tools to retrieve, manage & analyze synchrophasor data

Project Participants

Project lead

- ISO New England: 1 Sullivan Road, Holyoke, MA 01040
- Dave Bertagnolli: 413-535-4330 (dbert@iso-ne.com)
- Eric Wilkinson: 413-540-4686 (ewilkinson@iso-ne.com)

Technical contributors

- Andrew Armenia – Rensselaer Polytechnic Institute
- Luigi Vanfretti – Rensselaer Polytechnic Institute
- Jim Hackett – Mehta Tech, Inc.
- Tony Ranson – Mehta Tech, Inc.
- Mariana Vaiman – V&R
- Dave Hoyt – ISO New England
- John Galloway - ISO New England
- Dave Hotchkiss - ISO New England

Additional information on: Synchrophasor Infrastructure and Data Utilization (SIDU) for New England

A distributed approach to collecting and distributing
synchrophasor data

PMUs

- Synchrophasors from approximately 30 additional substations
 - 5 existing substations with multi function PMUs
- Approximately 560 channels total
 - Average of 16 synchrophasors per substation
- Synchrophasor can originate in any device:
 - Dedicated PMU, Other PDCs Power Donuts, etc.
 - New or existing relays
 - Additional cyber security issues
 - New or existing multi-function devices
 - DFRs & DDRs: higher resolution data available

PMU Owners

- All PMUs owned by the host TO (7)
 1. Bangor Hydro (2)
 2. Central Maine Power (4)
 3. National Grid (6)
 4. Northeast Utilities (15)
 5. NSTAR (4)
 6. United Illuminating (4)
 7. Vermont Electric (2*)

**may locate some PMUs on distribution system*

PMU Location Criteria

- Many factors:
 - Major substation
 - Physical access, convenience, telecommunications
 - Application value
 - State estimator observability
 - Proximity to areas with stability/oscillatory phenomena
- Also consider NERC/NPCC requirements
 - PRC-002-NPCC-01

Security Approach

- Physical security
 - Existing NERC Standards are adequate for all SCADA and synchrophasor data
- Cyber security & Critical Data Issues
 - Cyber security protection may impact performance
 - Classification as Critical Data has similar implications
 - Initially, synchrophasors not critical data
 - Provide data for researchers & development of tools (analysis, visualization, etc.)
 - At some point in the future, System Operators may make some operating decisions based on synchrophasors
 - *Design assumes synchrophasor data is critical*
 - *Performance issues addressed later*
 - Control through this system not envisioned

Project Timeline

- By end of 2010:
 - Establish FIPS PDC at ISO-NE
 - Communicate with at least one existing PMU
 - Install some new PMUs
- By end of 2011:
 - Establish communications between ISO FIPS & TVA
 - Establish FIPS at one or more Transmission Owners
 - Communicate with Transmission Owner FIPS
 - Communicate with remaining existing PMUs
 - Communicate with some of the new PMUs
 - Install more new PMUs
 - Install ROSE software
- By end of 2012:
 - Establish FIPS at remaining Transmission Owners
 - Communicate with remaining FIPS
 - Install remaining new PMUs
 - Communicate with remaining new PMUs
 - Develop ROSE visualization